news notes

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RU celebrates 50th anniversary of historic DNA discovery

Feb. 3: Experts discuss 1944-53 period

How did Oswald Avery, Colin MacLeod and Maclyn McCarty's discovery that DNA is the genetic substance affect the field of genetic research between 1944 and 1953? Six of the world's leading scientists active in this formative period will participate in a roundtable discussion of this topic Thurs., Feb. 3, at 4:00 P.M., in Caspary Auditorium.

"This unique event brings together those pioneers who took the first steps in the molecular revolution of 20th-century biology," said President Torsten Wiesel. "It will explore the field of genetics in the period between the Avery lab's discovery and James Watson and Francis Crick's finding of DNA's double-helical structure."

Robert Olby, visiting professor at Rockefeller and author of *The Path to the Double Helix*, who will moderate the panel, said: "After a brief outline of their work, the panel will be invited to recall the impact upon them of the discovery that the transforming principle is DNA, and to describe how their research was directed thereafter. I hope this discussion will yield valuable information on this great episode in modern science and will bring to life the personalities of those names known to many only as authors of famous papers."

Participants in the panel discussion, who will be introduced by Professor Norton Zinder, include:

• Erwin Chargaff. Chargaff, an eminent biochemist, is currently professor emeritus at Columbia University. Educated at the University of Vienna (Ph.D., 1928), he was a fellow at Yale University (1928-30); assistant at the University of Berlin (1930-33); and research associate at the Pasteur Institute (1933-34). In 1935 he went to the College of Physicians and Surgeons at Columbia University where he moved up the ranks to become professor and department chairman.

Initially, Chargaff was interested in a range of biochemical fields, including lipid metabolism and blood coagulation. Following the Avery lab's paper, Chargaff focused on DNA. Using paper chromatography and ultraviolet spectroscopy, he found the composition of DNA to be constant within a species but to differ widely between species. In addition, Chargaff discovered that, no matter what species was examined, the number of purine bases (adenine and guanine) always equaled the number of pyrimidine bases (cytosine and thiamine); the number of adenine bases always equaled the number of thiamine bases; and the number of guanine bases equaled the number of cytosine bases. Chargaff's discovery of base-pairing, announced in 1950, was critical for the development of the double-helical model of DNA.

A member of the National Academy of Sciences (NAS), Chargaff has received many honors, including the National Medal of Science.

• Seymour Cohen. Cohen, a prominent biochemist, is currently American Cancer Society Research Professor Emeritus at SUNY, Stony Brook. A graduate of the City College of New York (B.S., 1936), Cohen's doctoral training at Columbia University (Ph.D., 1941), was guided by Chargaff. From 1941 to 1942 Cohen was affiliated with Wendell Stanley's lab at Rockefeller, where he was the first to find an RNA larger than a tetranucleotide. From 1942 to 1943 he worked at Columbia. He then accepted a position at the University of Pennsylvania (1943-71), moving up the ranks to Hartzell Professor of Therapeutic Research and department chair-

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Panel to discuss historic DNA period

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man. In 1971 he accepted a position at the University of Colorado School of Medicine. In 1976 he joined SUNY, Stony Brook.

In 1946 Cohen began a series of studies using radioactive labeling. These studies were aimed at understanding how, shortly after an *E. coli* organism was infected with a bacteriophage called T2, the bacterial cell would burst, releasing several hundred replicas of the invading organism. These studies suggested the importance of DNA synthesis in viral multiplication. In 1952, Cohen and a colleague, G. Wyatt, discovered a new pyrimidine in viral DNA and went on to find the enzyme that made this novel compound. Cohen's group showed that this enzyme did not exist before viral multiplication.

A member of the Institute of Medicine of the NAS, Cohen is the recipient of many awards and honorary degrees.

• Alfred Day Hershey. Hershey was awarded a Nobel Prize for his discoveries concerning the replication mechanism and the genetic structure of viruses. After graduating from Michigan State University (B.S., 1930; Ph.D., 1934), Hershey worked at the Washington University School of Medicine (1934-50), as an assistant bacteriologist, instructor, then associate professor. Next, Hershey moved to the Carnegie Institute, where he was a staff member of the Genetic Research Unit (1950-62) then director (1962-74).

In 1945 Hershey and Salvador Luria independently showed that spontaneous mutations occur in bacteriophages. The following year Hershey and Max Delbrück independently demonstrated genetic recombination between phages in the same cell. Collaborating with Martha Chase, Hershey conducted a seminal experiment in 1952 showing that DNA is the genetic material of bacteriophage (viruses that infect bacteria). Using radioactive tracer techniques, they demonstrated that only DNA enters the bacterial cell; the virus's protein coat stays attached to the cell wall's exterior.

A member of the NAS, Hershey has received many honors in addition to the Nobel Prize (won with Delbrück and Luria), including the Albert Lasker Award.

• Rollin Hotchkiss. Hotchkiss, a pioneering biochemist and geneticist, is currently professor emeritus at Rockefeller. He received a B.S. in 1932 and a Ph.D. in 1935, both from Yale. He then joined Rockefeller as a fellow and was appointed professor in 1955.

Hotchkiss's early research dealt with the immunochemistry of bacterial polysaccharides and protein chemistry. He pioneered the exploration of variant types of DNA that cause bacteria to undergo specific genetic changes from sensitivity to resistance to sulfonamide and other drugs. From 1939 to 1943 he worked with René Dubos on the development and purification of gramicidin and tyrothricin, the first natural antibiotics to be isolated. Shortly after the Avery lab's 1944 discovery, Hotchkiss began working with Avery to develop methods for the quantitative study of transformation, to investigate the mechanism by which DNA enters a cell and expresses its function, and to refine methods for following the fate of DNA during transformation.

Hotchkiss has received many honors including election to the NAS and several honorary degrees, including one from Rockefeller.

• Joshua Lederberg. Lederberg, University Professor and former president of Rockefeller, is a distinguished geneticist and Nobel laureate. A graduate of Columbia College (B.A., 1944) and Yale (Ph.D., 1947), Lederberg joined the faculty of the University of Wisconsin in 1947. In 1959 he joined the Stanford University School of Medicine, where he founded the Department of Genetics. In 1978, he came to Rockefeller as its fifth president, serving until 1990. Throughout his career, Lederberg has taken important advisory roles in government.

While a Ph.D. student at Yale working with Edward Tatum, Lederberg discovered a "sexual breeding" system whereby two bacteria conjugate and form a connecting bridge through which one passes a chromosomal strand to the other. This discovery helped to make bacteria available for genetic research, and eventually for biotechnology. Subsequent research with Zinder showed that bacterial genetic material is exchanged not only by conjugation, when the entire complement of chromosomes is transferred from one bacterial cell to another, but also by transduction, when only fragments are transferred. Today, Lederberg heads a research team investigating how DNA can vary in its conformation, how this is influenced by the environment, and how this may affect the localization of gene mutations.

In addition to the Nobel Prize, Lederberg's honors include the National Medal of Science, election to the NAS, and charter membership in its Institute of Medicine.

• Maclyn McCarty. McCarty, professor emeritus at Rockefeller and a co-author of the historic 1944 paper, is a renowned microbiologist. McCarty graduated from Stanford University (A.B., 1933) and the Johns Hopkins University (M.D., 1937). At Johns Hopkins, he was successively intern, assistant resident and assistant in the pediatrics department. He was a medical fellow, researching sulfonamide drugs at New York University from 1940 until he joined Rockefeller in 1941. At Rockefeller, he rose to professor and senior physician, then physician-in-chief of The Rockefeller University Hospital.

His work with Avery and MacLeod was significant because transformation—the artificial transfer of genetic material from one bacterium to another—was brought about in a test tube by a highly refined substance consisting principally of nucleic acid. This was the first direct evidence that DNA, a substance then thought to lack the necessary chemical diversity, was responsible for genetic continuity. A corollary of this discovery, that nucleic acid in some way controls the cell's synthesis of certain products, has had wide-ranging implications. McCarty has also studied streptococci and isolated both extracellular and cellular components of this organism.

A member of the NAS, McCarty has received many honors, including a number of honorary degrees; the Medal of the New York Academy of Medicine; and the Who's Who in America Achievement Award.